

REMARKS

The above amendments to the above-captioned application along with the following remarks are being submitted as a full and complete response to the Office Action dated September 11, 2007. In view of the above amendments and the following remarks, the Examiner is respectfully requested to give due reconsideration to this application, to indicate the allowability of the claims, and to pass this case to issue.

Status of the Claims

Claims 1-19 and 22-23 are under consideration by the Examiner in this application. Claims 20-21 are being without prejudice or disclaimer. Claims 1, 2, 4-5, 8-9 and 12 are being amended, as set forth in the above marked-up presentation of the claim amendments, in order to more particularly define and distinctly claim applicants' invention. A new claim 23 is being added.

All the amendments to the claims and the specification are supported by the specification. Applicants hereby submit that no new matter is being introduced into the application through the submission of this response.

Prior Art Rejections

Claims 1-19 and 22 were rejected under 35 U.S.C. §103 (a) as being unpatentable over Sato et al. (US 2004/0111441) in view of McBrearty et al. (US 2002/0133681) and Pitts (US 6,205,475). This rejection has been carefully considered, but is most respectfully traversed.

The file replication method of the present invention creates, in a distributed file system (e.g., Fig. 1) including a plurality of network storage apparatus and a replication system each connected to a network 102, the replication system having a management table 157 for managing *attribute information* of all files and all directories in a first network storage apparatus 103 as a replication source, a partial copy of data stored in the first network storage apparatus 103 into a second network storage apparatus 104 as a replication destination (Fig. 7; *"The unified management directory 157 manages only the files-and-directories tree structure of the entire virtualized-and-unified file system 103 including the network storages 120 to 122 and all the file identifiers (they include attribute information). Although the unified manage directory 157 provides the files-and-directories tree structure for the clients, each of the files in the unified management directory 157 does not have data as the file entity. All data are stored in distributed*

relation in the network storages 120 to 122.” p. 22, last paragraph). The method comprising the steps of: preliminarily recording replication information (i.e., corresponding to the information registered into the rule table 412 of Fig. 4; p. 57, lines 9-19) indicating whether or not each of the files and the directories stored in said first network storage apparatus is an object to be copied in said replication system (p. 7, lines 9-12; p. 34, lines 4-8; p. 36, lines 10-13); receiving a file access request from a client; judging whether or not a replicating operation should be performed with execution of said file access request by using said management table and said replication information; and simultaneously transferring, if a result of said judgment is such that the replicating operation should be performed, said file access request to said first network storage apparatus and to said second network storage apparatus. The method recited in claim 9 includes more details.

The invention as recited in claim 4 is directed to a replication system for implementing the method recited in claim 1. Claim 12 recites a similar system.

As recited in claim 23, said replication information, which indicates whether or not each of the files and the directories stored in said first network storage apparatus is an object to be copied, was preliminarily set by an administrator (p. 34, line 8) and then recorded in said replication system.

Applicants respectfully contend that the cited references fail to teach or suggest such (1) “a management table 158 (Fig. 7) for managing attribute information of all files and all directories in a first network storage apparatus,” (2) such a step of “preliminarily recording replication information indicating whether or not each of the files and the directories stored in said first network storage apparatus is an object to be copied in said replication system,” (3) such a step of “judging whether or not a replicating operation should be performed with execution of said file access request by using said management table and said replication information,” and (4) such a step of “simultaneously transferring, if a result of said judgment is such that the replicating operation should be performed, said file access request to said first network storage apparatus and to said second network storage apparatus” according to the present invention.

Regarding the (1) feature, each of Saito’s replication system is connected to a network and has a management table for managing attribute information of all files and directories in the network storage apparatus as a replication source (Fig. 3; [0075]; p. 3, last paragraph of the

outstanding Office Action), while Saito's attribute information merely includes "the key attributes of a replica (Fig. 3). The key attributes of Saito's replica only include timestamps (ts) and the version vectors (vv) record the last time a file was modified ([0075]). Saito's attribute information is essentially different from the "*attribute information* on all files and all directories" according to the present invention. At least, Fig. 3 does not show any attributes of any directory. The other cited references fail to compensate for Saito's deficiencies.

Regarding the (2) feature, the relevant descriptions in Saito [0069]-[0070] (p. 4, 2nd paragraph of the outstanding Office Action) only specify whether a replica is a gold/core or bronze/non-core replica, rather than "indicating whether or not each of the files and the directories stored in said first network storage apparatus is an object to be copied" as the "replication information" of the present invention. The other cited references fail to compensate for Saito's deficiencies.

Regarding the (3) feature, the Examiner (p. 4, 4th paragraph of the outstanding Office Action) admitted that Saito does not disclose it. McBrearty ([0009]) was relied upon by the Examiner to provide such a teaching. However, McBrearty only judges whether or not to perform a mirroring operation by determining whether "*usage of a particular volume or portion exceeds a certain level* ([0009])", rather than "using said management table and said replication information" of the present invention. As discussed, the other cited references fail to provide the management table and the "replication information" of the present invention. In addition, McBrearty copies/mirrors per volume, rather than per file or per directory as the present invention.

Regarding the (4) feature, the Examiner (p. 5, lines 9-11 of the outstanding Office Action) admitted that Saito and McBrearty do not disclose it. Pitts (col. 23, lines 59-67) was relied upon by the Examiner to provide the teaching. Although Pitts mentioned that the client requests MAY be received simultaneously at two or more Network distributed Cache (NDC) sites (col. 9, lines 47-49), the design purpose of Pitts is to take advantage of the real situation that "*due to processing and transmission delays among the NDC sites* (col. 24, lines 3-4)," the requests is NOT simultaneously sent to two or more NDC(s), but in cascade to two or more NDC(s) along a transmission path: an NDC client site 24 -> intermediate NDC sites 26A, 26B -> NDC server site 22 (col. 9, lines 47-49), such that intermediate NDC sites may transfer data previously saved therein (cached) to the NDC client site 24 (Abstract). Pitts' NDC sites only

receive the same file access request from a client in order. At an intercept point, only one request is generated to one request. As such, Pitts actually teaches away from the invention. It is well established that a rejection based on cited references having contradictory principles or principles that teach away from the invention is improper.

Applicants contend that the cited references or their combinations fail to teach or suggest each and every feature of the present invention as recited in independent claims 1, 4, 9 and 12.

Regarding claim 2, the “synchronization information” of the present invention is “indicative of whether or not contents of “each of files and directories that is indicated as an object to be copied” are respectively synchronized (i.e., maintained consistency) in the first and second network storage apparatuses (e.g., synchronization flag 410, p. 33, 2nd paragraph). However, Saito merely synchronously pushes the updates (i.e., synchronous information) to all replicas to maintain the data consistency ([0050]). The synchronous information in Saito is data update information, not information of “whether or not contents of each of files and directories that is indicated as an object to be copied are respectively synchronized in the first and second network storage apparatuses” as recited in claim 2. The other cited references fail to compensate for Saito’s deficiencies.

Regarding claim 5, Saito’s consistency management (i.e., unit) only maintains the consistency between files and directories of a file system ([0069]), rather than just “the files and directories that is indicted as an object to be copied” as the present invention.

Regarding claim 8, Saito only disclose general file identification or ID of directory and replicating file ([0070]; Fig. 3), which is different from “rule indicating that a file having a specified user or group identifier, a file belonging to a specified directory, or a file having a specified file identifier as an object to be copied as preliminarily recorded” as the present invention. From the relevant description, Saito cannot decide which directory and file is chosen. Thus, Saito does not provide the effect of this invention.

Regarding claim 12, McBrearty’s mapping table (i.e., unit) for network storages ([0023]) is merely a table to match volume /volume-portion and usage. It does not “hold the file access request of virtualized-and-unified file system and the file which is the target for access of the request and manages correspondence of network” as the present invention.

Regarding claim 22, the Examiner asserted that “Saito implicitly discloses the limitation of capacity management unit by disclosing that a membership module maintain status or other

nodes including available disk space using by files and file system, and replica is remove by replication engine when a node runs out of space and reclaiming [i.e., acquiring] of disk space if a disk runs out of space, see [0064]; [0077]; [0098]).” However, Saito does not ask the disk storage capacity of other nodes periodically. Rather, the shortage of disk storage capacity is recognized at the producing stage of a replica. On the other hand, by asking the disk storage capacity of other nodes periodically, the present invention judges whether a replica can be created, and then creates a replica.

Applicants contend that the cited references or their combinations fail to teach or suggest each and every feature of the present invention as recited in claims 2, 5, 8, 12, 17 and 22. As such, the present invention as now claimed is distinguishable and thereby allowable over the rejections raised in the Office Action. The withdrawal of the outstanding prior art rejections is in order, and is respectfully solicited.

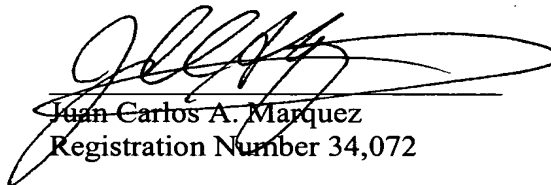
Conclusion

In view of all the above, Applicant respectfully submits that certain clear and distinct differences as discussed exist between the present invention as now claimed and the prior art references upon which the rejections in the Office Action rely. These differences are more than sufficient that the present invention as now claimed would not have been anticipated nor rendered obvious given the prior art. Rather, the present invention as a whole is distinguishable, and thereby allowable over the prior art.

Favorable reconsideration of this application as amended is respectfully solicited. Should there be any outstanding issues requiring discussion that would further the prosecution and allowance of the above-captioned application, the Examiner is invited to contact the Applicant's undersigned representative at the address and phone number indicated below.

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